REMARKS

By this Amendment, claims 1-17 are pending. Applicants have amended claims 1 and 14 and the specification for clarity and have added new claims 16 and 17 to claim more fully subject matter originally disclosed. No new matter has been introduced by the amendments to claims 1 and 14 or by new claims 16 and 17. Reconsideration and allowance of the present application based on the foregoing amendments and the following remarks are respectfully requested.

Applicants have amended the specification to include specific description of reference numerals M1, M2, P1 and P2 shown in FIG. 1 in response to the Examiner's objection to the drawings.

Claims 2, 6 and 9 were rejected under 35 U.S.C. §112, second paragraph. Applicants have specifically used the term "setpoint" to refer to a desired position point to which a controller, e.g., a servo system, controls a controlled object or system, e.g., an object held by one of the support structure and the substrate table. Applicants submit that the term "setpoint" is common in the art and would be known by one skilled in the art in context of the detailed description of Applicants' specification. Accordingly, Applicants submit that claims 2, 6 and 9 are definite and comply with 35 U.S.C. §112, second paragraph.

Claims 1-15 were rejected under 35 U.S.C. §102(e) over Miyachi, U.S. Patent No. 6,400,456. Applicants respectfully traverse this rejection because Miyachi does not disclose every feature of the rejected claims.

For example, claim 1 (and its dependent claims 2-13) recite(s) a lithographic projection apparatus comprising, among other elements, a filter connected between a level sensor and a servo system for filtering the position signal, wherein the filter has a transfer function representative of a difference between an actual measurement of the level sensor and an ideal measurement of the level sensor. Independent claim 14 (and its dependent claim 15) recites(s) a method of manufacturing a device comprising, among other features, filtering a position signal using a filter transfer function representative of a difference between an actual measurement of the level sensor and an ideal measurement of the level sensor before it is used by a servo system to control the position of the object.

In contrast to the claimed filter recited in independent claim 1 and its dependent claims 2-13, Miyachi discloses a lithographic projection apparatus in which an arithmetic section of a main control system serves as a filter means directed to focus range control. More specifically, the arithmetic section of Miyachi generally eliminates components having

a specific wavelength for eliminating disturbance caused by such wavelengths during focus range control (see col. 14, line 1 to col. 15, line 4). However, the arithmetic section/filter means of Miyachi does not have a transfer function representative of a difference between an actual measurement of the level sensor and an ideal measurement of the level sensor as recited in independent claim 1 (and its dependent claims 2-13). Furthermore, Miyachi's apparatus does not filter a position signal using a filter transfer function representative of a difference between an actual measurement of the level sensor and an ideal measurement of the level sensor as recited in independent claim 14 (and its dependent claim 15). Thus, the filter means of Miyachi is not a filter, as recited in independent claim 1 (and its dependent claims 2-13), nor does Miyachi disclose the claimed method of manufacturing, as recited in independent claim 14 (and its dependent claim 15). Accordingly, Applicants respectfully request withdrawal of this rejection of claims 1-15.

Claims 1-15 were rejected under 35 U.S.C. §103(a) over van der Werf, U.S. Patent No. 5,191,200, in view of Miyachi. Applicants respectfully traverse this rejection because the combination of van der Werf and Miyachi does not teach every feature of the rejected claims.

The Office Action admits that van der Werf fails to disclose a filter as claimed and relies on Miyachi for its disclosure of the arithmetic section or filter means. However, for at least the reasons set forth above, Miyachi does not disclose the claimed filter recited in independent claim 1 (and its dependent claims 2-13) or the claimed filtering recited in independent claim 14 (and its dependent claim 15). Thus, Miyachi does not remedy the deficiencies of van der Werf with respect to the filter recited in independent claim 1 or the filtering recited in independent claim 14. Even if Miyachi could be combined with van der Werf, which Applicants do not concede, the combination of van der Werf and Miyachi would not teach a filter as recited in independent claim 1 (and its dependent claims 2-13) or the filtering recited in independent claim 14 (and its dependent claim 15). Accordingly, Applicants respectfully request withdrawal of this rejection of claims 1-15.

New claims 16 and 17 are directed to filtering a position signal in the time domain, which is not taught nor suggested in the references of record including van der Werf and Miyachi. Thus, new claims 16 and 17 are submitted to be patentable.

In view of the foregoing, the claims are now believed to be in form for allowance, and such action is hereby solicited. If any point remains in issue which the Examiner feels may be best resolved through a personal or telephone interview, please contact the undersigned at the telephone number listed below.

Attached is a marked-up version of the changes made to the specification and claims by the current amendment. The attached Appendix is captioned **"Version with markings to show changes made"**.

All objections and rejections having been addressed, it is respectfully submitted that the present application is in a condition for allowance and a Notice to that effect is earnestly solicited.

Respectfully submitted,

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Enclosure: Appendix

APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

The specification is changed as follows:

Page 9, delete the whole paragraph starting in line 6 and replace it with the following new paragraph:

The beam PB subsequently intercepts the mask MA, which is held on a mask table MT. Having traversed the mask MA, the beam PB passes through the lens PL, which focuses the beam PB onto a target portion C of the substrate W. With the aid of the second positioning means (and interferometric measuring means IF), the substrate table WT can be moved accurately, e.g., so as to position different target portions C in the path of the beam PB using wafer alignment marks P1, P2. Similarly, the first positioning means can be used to accurately position the mask MA using mask alignment marks M1, M2 with respect to the path of the beam PB, e.g., after mechanical retrieval of the mask MA from a mask library, or during a scan. In general, movement of the object tables MT, WT will be realized with the aid of a long-stroke module (course positioning) and a short-stroke module (fine positioning), which are not explicitly depicted in FIG. 1. However, in the case of a wafer stepper (as opposed to a step-and-scan apparatus) the mask table MT may just be connected to a short-stroke actuator, or may be fixed.

IN THE CLAIMS:

Please amend claims 1 and 14 as follows:

1. (Amended) A lithographic projection apparatus comprising:

a radiation system for supplying a projection beam of radiation;

a support structure for holding patterning structure, the patterning structure serving to pattern the projection beam according to a desired pattern;

a substrate table for holding a substrate; [and]

a projection system for projecting the patterned beam onto a target portion of the substrate;

a level sensor for measuring at least one of a perpendicular position and tilt about at least one parallel axis of a surface of an object held by one of the support structure and the

substrate table, and generating a position signal indicative thereof, perpendicular referring to a direction substantially perpendicular to the said surface and parallel referring to a direction substantially parallel to said surface;

a servo system responsive to said position signal for moving said object to a desired position; and

a filter connected between said level sensor and said servo system for filtering said position signal, the filter having a transfer function representative of a difference between an actual measurement of the level sensor and an ideal measurement of the level sensor.

14. (Amended) A method of manufacturing a device comprising:

providing a substrate that is at least partially covered by a layer of radiation-sensitive material;

providing a projection beam of radiation;

patterning the projection beam to produce a pattern in its cross-section;

measuring at least one of a perpendicular position and tilt about at least one parallel axis of a surface of an object with a level sensor and generating a position signal indicative thereof, perpendicular referring to a direction substantially perpendicular to the said surface and parallel referring to a direction substantially parallel to said surface;

projecting the patterned beam of radiation onto a target portion of the layer of radiation-sensitive material while operating a servo system responsive to said position signal to maintain said object at said desired position; and

filtering said position signal using a filter transfer function representative of a difference between an actual measurement of the level sensor and an ideal measurement of the level sensor before it is used by a servo system to control the position of the object.

New claims 16 and 17 have been added.

End of Appendix